

**DRAFT**  
*Proposal and Study Plan*

An inventory of nesting landbirds in National Parks of  
Southwest Alaska, 2003–2006

*Submitted to:*

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## Introduction

The National Park Inventory and Monitoring Program was implemented to assure that all park units with significant natural resources have sufficient knowledge of those resources to guide their protection. The national strategy consists of hierarchical components that begin with basic natural resource inventories, followed by prototypical monitoring programs that evaluate alternative monitoring designs and strategies, which in turn result in implementation of operational monitoring of resources in all parks.

The Inventory and Monitoring Program for Alaska parks was begun in 2000. Four networks of parks were recognized, each based on geographic proximity and similarity of ecological units. The Southwest Alaska Network (SWAN) consists of 5 units: Katmai National Park and Preserve (16,600 km<sup>2</sup>), Lake Clark National Park and Preserve (16,200 km<sup>2</sup>), Kenai Fjords National Park (2,710 km<sup>2</sup>), Aniakchak National Monument and Preserve (2,440 km<sup>2</sup>), and the much smaller (125 km<sup>2</sup>) Alagnak Wild River corridor adjacent to Katmai National Park and Preserve. In total the five units of SWAN comprise almost 38,000 km<sup>2</sup> (9.4 million acres), or 2% of Alaska's land area.

Over this vast landscape occur a diversity of habitats, geologic features, and climatic conditions that are rarely equaled elsewhere in Alaska. The most prominent landscape feature throughout SWAN Parks is mountains. But unlike other montane regions of Alaska, the area about the base of the Alaska Peninsula is one of the most tectonically active regions in the world. In addition to the 15 active volcanoes in the SWAN area, over 100 earthquakes of magnitude 6.0 or greater have been recorded there during the past century (P. Spencer unpubl.). This tectonic activity has produced such features as the unimaginably rugged and glacier-clad Neacola Mountains of Lake Clark National Park, the numerous and frequently active volcanoes of the southern Alaska and Aleutian ranges, especially in Katmai National Park, and the massive caldera of Aniakchak Volcano, the focal point of Aniakchak National Monument and Preserve. In all three units one can find peaks of between 1,000- and 3,000-m elevation within 30 km of the Pacific tideline. Interspersed among the mountains are entire river basins with numerous valleys, extensive outwash and alluvial plains, and some of Alaska's largest lakes. Tectonics alone, however, did not shape the present landscape. Extensive glaciers and ice fields are still prevalent in the two northern parks, remnants of numerous Wisconsin-age glacial advances that created most of the large lakes, rounded valleys, and extensive drift deposits found along the entire Bristol Bay lowlands and in the Lime Hills ecoregion of Lake Clark (Detterman 1986, Manley and Kaufman 2002).

Climate and localized weather are two additional factors that strongly influence the avifaunal composition of the region, primarily as the principal determinant of vegetation patterns. The eastern portions of all parks are strongly influenced by a Pacific maritime climate (wet, cloudy, windy, cool summers, wet winters) while the western portions are continental (Lake Clark) or transitional (Katmai and Aniakchak) and characterized by wider temperature ranges and less precipitation. In general, these climatic differences produce a north-south gradient in the complexity of landcover types throughout the SWAN area. For example, basic ecological mappings of landtypes and their distributions within each park have identified 14 different ecological subsections totaling 51 polygons in Lake Clark, 20 subsections in Katmai (41 polygons), and 5 subsections (28 polygons) in Aniakchak (Table 2). Probably the most

obvious feature of this landcover gradient among SWAN parks is the transition from a heavily forested-woodland environment in the Lake Clark region to a treeless, low shrub, ericaceous-heath landscape on the Alaska Peninsula that begins in the vicinity of Katmai (Nowacki et al. 2002).

Not surprisingly, the diversity of avifauna among the three parks is greatest in Lake Clark at about 200 species (Gill et al. 1999, Alaska Natural Heritage Program 2000, A. Bennett unpubl.) and decreases gradually on a southward gradient with about 170 species recorded in Katmai (Osgood 1904; Cahalane 1944, 1959; Williamson and Peyton 1962; Gibson 1970; D. Gibson, S. Savage unpubl.), and 125 species in Aniakchak (Sowl 1988; Dewhurst et al. 1995, 1996; Alaska Natural Heritage Program 2000; S. Savage and National Park Service unpubl.). Information about the general seasonal occurrence of birds within the three parks is comparatively good but for three important exceptions: 1) early spring migration and early nesting for most species that nest away from the coast, 2) the entire season for montane-nesting species (but see Gill et al. 1999), and 3) overall information for several prominent ecological subsections such as the entire Lime Hills ecoregion of Lake Clark, the Bristol Bay Lowlands of Katmai and Aniakchak, and most higher montane areas of all parks, but especially in Katmai and Aniakchak.

Information from relatively small portions of SWAN Parks (Gill et al. 1999) and elsewhere in Alaska (Gill et al. 2002, Tibbitts et al. 2003) points to the importance of montane areas as nesting habitat for particular assemblages of birds, most notably several medium- to large-sized shorebirds and several passerine species. The nesting status and distribution of species such as Pacific Golden-Plover (*Pluvialis fulva*), American Golden-Plover (*P. dominica*), Surfbird (*Aphriza virgata*), Wandering Tattler (*Heteroscelus incanus*), and Baird's (*Calidris bairdii*), Western (*C. mauri*) and Rock (*C. ptilocnemis*) sandpipers is poorly known for the parks, particularly in Katmai and Aniakchak (Senner and McCaffery 1997, Gill et al. 1999, Gill et al. 2002a, c). Enough anecdotal observations have been collected to suggest that the two Alaska Peninsula parks may represent not only major breeding range extensions for most of these species but also support significant numbers of each. For one particularly little known seabird, the Kittlitz's Murrelet (*Brachyramphus brevirostris*), a quarter of the nests found in the North American portion of its range ( $n = 20$ ) have come from steep scree or rocky slopes of Alaska Peninsula mountains (Day et al. 1999). The proposed inventory will cover extensive portions of potential murrelet nesting habitat and stands to greatly increase knowledge of the species' distribution and habitat preferences.

To determine the status of landbirds nesting in SWAN Parks, a large-scale, habitat-based inventory and monitoring program is proposed. Data generated from such a program will provide baseline information on the distribution and abundance of birds and provide the basis for which a more rigorous monitoring program can be developed.

## Goals and Objectives

The goal of this project, following that of the Park Service's National Inventory and Monitoring Program, is to document the occurrence and determine the status of 90% of the species of landbirds likely to occur in the Southwest Alaska Network of Parks. We will use a repeatable,

scientifically valid sampling design suited to expansive areas with limited access to address three principal objectives:

1. Collect and summarize all existing information on the occurrence, distribution, and abundance of all landbird species using habitats in Southwest Alaska Network Parks.
2. Obtain geographic data layers needed to characterize elevation, slope, and habitat (vegetation and hydrology), and measures of seasonal green-up.
3. Determine species-specific associations between distribution, abundance, and habitat characteristics, particularly for species of shorebirds and passerines occurring on upland areas during the breeding season.

## Methods

### *Study Area and Access*

The study area encompasses three of the five units of SWAN: Lake Clark National Park and Preserve (Lake Clark), Katmai National Park and Preserve (Katmai), and Aniakchak National Monument and Preserve (Aniakchak). Neither the Alagnak Wild River corridor nor Kenai Fjords National Park is included because the overall sampling design is not compatible with the physiography of either unit—Alagnak River because of its small size and Kenai Fjords because of its predominantly marine-based ecological subsections.

The study will occur during three consecutive field seasons (2003–2005). Because of prior commitments to inventory the Arctic Network of Parks and concomitant obligations of qualified personnel, on-ground work in spring 2003 will not begin until mid-June. This will allow us to begin an inventory of species with relatively late seasonal chronologies (e. g., most passerines), but will preclude extensive work on early-nesting avian groups such as shorebirds and raptors. Thus we expect the majority of the 2003 field effort to be devoted to 1) assessing intra-park seasonal phenologies for snow cover and green-up (mostly via aerial surveys and AVHRR data), and 2) refining the extent and landcover components of ecological subsections of each park (via aerial and on-ground surveys). Together with existing information this will allow us to set fairly exact field schedules based on clinal differences among parks in arrival dates and nesting schedules of birds. As presently understood, the period encompassing arrival and peak courtship for a given suite of species appears earliest at Lake Clark and latest at Aniakchak, possibly by as much as 3 to 4 weeks. Whether this will allow the same group of biologists to move sequentially among parks or require separate suites of crews for each park remains to be determined (see beyond).

To access sample plots during all field seasons we will use fixed-wing (e.g., Cessna 185, 206/207; deHavilland DHC-2 Beaver) and rotary aircraft (e. g., Hughes 500, Bell Jet Ranger, R44) staging out of Port Alsworth, King Salmon, and/or Port Heiden. Straight-line distances between bases and sample plots will range between 50 and 200 km, necessitating fuel caches to access and deploy personnel on some of the more distant plots.

### *Sampling Design*

For this study we will use a stratified random sampling design incorporating increased sampling intensity in areas of special interest to determine sample plots within the three National Parks. The design was initially used in Bering Land Bridge National Park and Preserve in 1999 (Gill et al. unpubl.) and a modified version thereof in the Arctic Network of Parks in 2002–2003 (Gill et al. 2002b, Tibbitts et al. 2003). The basis for the design is park-specific ecological unit maps. These maps delineate ecosystem regions (or ecoregions) based on numerous biotic and abiotic factors (e.g., geology, landforms, soils, vegetation) and are available at sectional (1:7,500,000 to 1:3,500,000) and subsectional (1:3,500,000 to 1:250,000) mapping scales. The actual sampling unit will consist of a 10-km x 10-km plot selected from an Alaska-wide GIS-generated sampling grid of similar-sized plots (B. Boyle unpubl.). The grid is aligned with the eastern boundary between Alaska and Canada and offset a random distance in the northward direction (after Overton 1993). Table 1 defines the terms used in the plot selection process.

**Table 1.** Definitions of terms used in the plot selection process.

Term	Definition
Section	Physiographic regions with similar geology and regional climate (Jorgenson et al. 2002). Sections are composed of subsections.
Subsection	Portion of a section with a more narrowly defined geology composed of repeated associations of geomorphic units (Jorgenson et al. 2002).
Subsection group	A collection of subsections that share topographic features (i.e., mountains, hills, foothills, uplands, glaciated uplands, and basins). Plots are selected within subsections or subsection groups.
Plot	10-km x 10-km sampling unit.

The sampling universe for each park unit will be defined using GIS data layers (digital elevation models, park boundaries, ecoregion boundaries, and sampling grid) and procedures that allow a plot to be included in the universe if the following conditions are met: 1) at least 50% of the area of the plot is within park boundaries, 2) 25% of the plot is at least 50 m above sea level, and 3) 50% of the plot has <30 degree slope. These criteria will identify a pool of plots from which a subset will be sampled each year during the two- to three-week period determined to be optimal for maximizing detections of birds (Gill et al. 2002b, Tibbitts et al. 2003). The two large parks, Katmai and Lake Clarke will likely require between 20 and 25 plots per park be censused during the study period, while the smaller Aniakchak Park may require about half that number of plots. Within each park, plots will be allocated based on 1) the diversity of habitats, 2) the uniqueness of certain habitats, and 3) the amount of area within each park. Depending on such things as the diversity and uniqueness of a park's ecological subsections, parks of about equal size, such as Katmai and Lake Clark, could receive markedly different allocations of plots.

Once the number of sample plots to be allocated per park is determined we will then determine how to allocate plot locations within each park (Appendix). We will do this by first calculating the area (ha) of each ecological subsection type or stratum (Table 2) within each

selected 10-km x 10-km plot and then label the plot according to its most abundant subsection type. Such labels will allow us to allocate sample plots proportionally to subsection occurrence. Samples will then be allocated in proportion to the size of the strata, except that subsections that are slightly smaller but unique in terms of habitat or geographic location will be allocated a single plot.

After plots are selected we will produce plot maps depicting the coverage and configuration of subsections within each plot so that sample points (= point counts; see following) can be spread across ecological subsection types in proportion to their area within the plot. Figure 2 demonstrates how the process of point allocation within a sample plot is interpreted in the field.

### *Point Count Surveys*

Birds will be sampled with variable circular plot methodology (Buckland et al. 2001) using protocols developed by the USGS Shorebird Project (Gill et al. 2002b, Tibbitts et al. 2003) and Alaska Landbird Monitoring Program (C. Handel unpubl., after Ralph et al. 1993). For Lake Clark and Katmai we will likely use four, two-person crews per year for two full field seasons in order to census the requisite 20–25 plots per park; for Aniakchak three, two-person crews will be required during each of the two field seasons (see Table 3). One member of each crew will have had extensive experience (3–8 field seasons) conducting point counts of birds using similar methodologies to those described here and most will have several years of field experience studying the avifauna of Alaska.

At each sample plot, we will conduct a total of 24 unlimited distance point counts. Previous studies of similar bird species in similar habitats (Gill et al. 2002b, Tibbitts et al. 2003, Gill et al. unpubl.) demonstrated that 24 points was the minimum number of points necessary to detect 90% of the breeding species likely to occur on a given plot. To minimize the probability of detecting the same individual bird at multiple points, we will space points along transects at 500-m intervals and space legs of transects within the same subsection type at least one drainage apart. Prior to going into the field, crews will use 1:63,360-scale maps to determine routes of potential transects, assuring that the routes cross gradients of elevation and landcover and that the required number of points is placed in each ecological subsection. Routes will be modified in the field when it becomes apparent that certain creeks or landforms can not be traversed safely.

When assessing early-season nesting species such as shorebirds and raptors we will conduct two counts at each point: 1) a 10-min count during which we collect detailed information on shorebirds and shorebird predators and keep a tally of all other avian species, and 2) a subsequent 5-min count at the same point during which we collect detailed information on all other bird species: passerines, waterbirds, ptarmigan, etc. In addition, when traveling between points we will record all bird species that have not yet been observed at previous sampling points. When we assess mid- to late-season nesting species (most passerines) we will conduct a single 10-minute count during which we will focus on songbirds but also attempt to record all avian species, especially shorebirds and their avian predators. If, however, these latter groups are still very active during mid-season we will focus strictly on passerines. During all field seasons we will compile a comprehensive bird list for the 1.5–2 days we were present at each plot.

At the start of each 10-min count, we will record the following: GPS location and positional error, date, time of day, observers, elevation (using altimeter), slope, aspect, estimated wind speed, wind direction, precipitation, percent cloud cover, air temperature, percent snow cover, and percent cover of all vegetation types within 150 m of the point. We will classify vegetation to at least level III of the Viereck et al. (1992) system, and further classify to level IV when possible. Observers will use laser rangefinders when necessary to determine the 150-m radius around a point and then visually estimate percent cover of the different vegetation types within the circle. Under most field conditions the measurement accuracy of the rangefinders is  $\pm 2$  m (Bushnell website).

For each detection of a shorebird or shorebird predator during the 10-min count and all other bird species during the 5-min count, we will record the following: elapsed time, species, number of individuals, and radial distance from the census point. When possible, we will collect additional data such as behavior, vocalizations, breeding status, and microhabitat with which the bird is associated. We will use rangefinders to estimate radial distance to individual birds. If an individual is heard but not seen, we will record the possible range of its location (e.g. 70–120 m, 300–400 m) by estimating (using rangefinders when possible) the distance to landmarks on either side of the calling bird. For birds at extreme distances (too far for the rangefinder) we will record the possible range of their locations using topographic features referenced on 1:63,360 maps.

## Data Management and Analysis

We will download geographic location data from GPS units. All field data will be entered into an Excel spreadsheet and transferred to a Microsoft Access database designed by the National Park Service. Data sheets will be copied and stored at two locations: Shorebird Project of the USGS Alaska Science Center, Anchorage, and NPS Headquarters, Anchorage, Alaska.

Between field seasons a GIS specialist will 1) develop metadata materials that will comply with Federal Geographic Data Committee's (FGDC) standards for digital geospatial metadata ([www.fgdc.gov/metadata/constan.html](http://www.fgdc.gov/metadata/constan.html)) and be compatible with the biological databases maintained by the Inventory and Monitoring Program of the National Park Service, and 2) construct maps for each species depicting (a) presence/absence data at the level of sample points and plots and (b) predicted distributions within each park unit.

Efficiency of the inventory will be determined after the first full field season (2004) using the program CAPTURE (Rexstad and Burnham 1991) to examine species that nest within each park. Sampling effort will be adjusted, if necessary to detect at least 90% of the estimated number of landbird species occurring in each park. The density (with 90% confidence intervals) of each species will be estimated for each vegetation type and for each sampling area as a whole by analyzing the distance data to develop detectability functions (Buckland et al. 2001). Time of day and season will be included as covariates (Fancy 1997, 2000).

Logistic regression will be used to estimate the probability of detecting a species at any location in the study area. A resource selection probability function (Manly et al. 1993) will be

constructed by comparing characteristics of the sample points that are used or unused by each species. The presence or absence of the species will be the dependent variable and habitat and topographic characteristics around the point will be used as explanatory variables. Because the points will be selected in a systematic random fashion, it will be assumed that the sampling fractions of used and unused points are equal and that probability function can be estimated. For those variables for which information is available on park-wide GIS, resource selection probability functions will be developed by comparing points used by each species with a randomly selected sample of points available in the study area. Maps depicting presence/absence data at sample points will be developed for each species. Predicted distributions maps for each species with sufficient data will be constructed for each park using elevation and terrain data.

## Quality Assessment/Quality Control

Field staff will be trained in: 1) identification of birds through sight and vocalizations, 2) distance estimation from a fixed point, 3) GPS training/orienteering, 4) identification and classification of vegetation, and 5) safety training. Those responsible for identifying birds must be proficient at identifying calls, songs, and plumages of Alaska birds; song and call identification will be tested using BirdMaster software with the Alaska Bird Song CD. Field training sessions for identifying birds, songs, and distance to birds will also occur prior to the survey. Those collecting vegetation information will be responsible for identifying the major tree, shrub, and herb species common to the parks. This knowledge will also be tested prior to actual field work.

### *Vouchering and Genetic Sampling*

The Principal Investigators for this effort recognize the importance of and justification for vouchering scientific data, including collection of whole specimens and/or tissues. However, the rigid time-constraints involved with the proposed sampling protocol will allow for only the most rudimentary vouchering of samples. For all rare or previously undetected species we will document occurrence through detailed notes and photographs, including GPS location data. Final results will identify population centers and range boundaries whereby focused voucher-sampling efforts can be conducted in the future. Any dead birds and/or bird parts that we find will be salvaged and sent to the University of Alaska Museum, Fairbanks.

### *Products*

Both interim and final products will be produced from information collected during the study. These include but are not limited to:

- Spatial data layer linked to landcover.
- Spatial data layer linked to abundance.
- Spatial data layer documenting critical areas for species of management concern.
- Annotated species lists linked to geographic and habitat attributes.
- Archived data on census protocol and location of sampling units.
- Annual and Final reports.
- Publications in peer-reviewed outlets.

## Project Timeline

### FY2003

#### *January 2003*

- Complete study plan.

#### *February-April 2003*

- Finalize sampling design (delineate areas, determine necessary sample sizes, determine accessibility, select sampling sites, prepare Minimum Tool Analysis for applicable park units).
- Arrange logistics for first field season (locate access points, assure Office of Aircraft Services [OAS] training and charter requirements in place).
- Hire part-time technician (Term GS-9) for GIS-based needs associated with study design and population of the database.
- Train field crews (voice recognition, hearing test, appropriate safety courses such as CPR, Wilderness First Aid, boat safety, aircraft safety, bear safety and firearms training).

#### *May-July 2003*

- Conduct aerial and on-ground reconnaissance to assess timing of seasonal chronology of montane portions of all parks and to refine ecological subsections and selected plot boundaries in Katmai National Park and Preserve and Aniakchak National Monument and Preserve.
- Census selected plots in Lake Clark National Park and Preserve.

#### *July-September 2003*

- Enter and summarize data.

### FY2004

#### *October 2003-April 2004*

- Data analysis.
- Refine study plan as needed.
- Prepare progress report (due 15 January 2004).
- Plan logistics for upcoming field season.

#### *April-June 2004*

- Train field crews.
- Census plots in Lake Clark National Park and Preserve (in part), Katmai National Park and Preserve, and Aniakchak National Monument and Preserve.

#### *July-September 2004*

- Enter and summarize data.
- Write annotated species accounts for all birds detected in sampled units of SWAN.

FY2005*October 2004-April 2005*

- Data analysis.
- Write annotated species accounts for all birds detected in sampled units of SWAN.
- Write progress report (due 15 January 2005).

*April-June 2005*

- Train field assistants.
- Census plots in Katmai National Park and Preserve and Aniakchak National Monument and Preserve, and Lake Clark National Park and Preserve (if needed).

*July-September 2005*

- Enter and summarize data.
- Write annotated species accounts for all birds detected in sampled units of SWAN.

FY2006*October -December 2005*

- Continue data analysis.
- Continue write-up.
- Write progress report (due 31 December 2005).

*January-May 2006*

- Prepare final report (due 1 May 2006).
- Provide NPS with the final data sets of shorebird abundance and landcover associations to be used in creating spatial data layers.
- Provide NPS with archived data (sampling design, survey protocol, location of all sampling sites, survey routes, and point counts).

**Park Contribution, Coordination, and Logistical Support**

Where feasible the NPS will assist with in-place logistics and project support. Examples include:

- Use of NPS aircraft (at reimbursable OAS rates) to transport survey crews to and from sites.
- Use of NPS boats and vehicles.
- Use of NPS remote facilities (ranger cabins if scheduling allows).
- Use of NPS bunkhouse and facilities in King Salmon and Port Alsworth.
- Use of NPS pilots and knowledgeable staff and cooperators to assess potential access sites throughout SWAN.
- Use of field equipment (e.g., radios, satellite phones, bear-proof containers).
- Access to GIS themes of Southwest Alaska Network Parks (DEM models, landcover).
- Assistance in developing NPS-compatible database structures.

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Table 2. Attributes of Ecological Subsections in Southwest Alaska Network Parks.

Park unit	Subsection abbreviation	Name	No. of polygons	Size (km <sup>2</sup> )
<b>Lake Clark</b>	CMI	Chigmit Mountains & Icefields	5	6100
	LCPM	Lake Clark Pass & Moraines	4	1800
	RVH	Rounded Volcanic Hills	10	2500
	WLTP	Western Lake Moraines & Till Plains	1	831
	WSH	Whitefish Sedimentary Hills	4	55
	SRMV	Stony River Morainal Valley	4	1000
	TH	Telaquana Highlands	1	275
	SKH	Skwentna/Kuskokwim Headwaters	2	2000
	CMTV	Chakachamna Moraines & Till Valleys	2	192
	SBU	String Bog Uplands	1	1
	CIMT	Cook Inlet Moraines & Till Plains	1	80
	CIOV	Cook Inlet Old Volcanics	8	850
	ISH	Iliamna Sedimentary Hills	3	510
	CIMI	Cook Inlet Marine Influences	5	6
<b>Total</b>			<b>51</b>	<b>16200</b>
<b>Katmai</b>	ARD	Alagnak River Lowlands	1	7
	BBL	Bristol Bay Lowlands	1	34
	BRN	Barrier Range Mountains-North	1	265
	BRS	Barrier Range Mountains-South	2	1190
	CDM	Cape Douglas Mountains	1	1143
	CLD	Coville Lake Deposits	1	120
	IDD	Iliamna Drift Deposits	1	268
	KEM	Kegulik Mountains	2	1474
	KLM	Kukaklek Lake Morains	2	957
	KRF	Katmi River Floodplain	1	109
	KRH	Kamishak River Hills	1	2293
	LOD	Lowlands Outwash & Drift Deposits	1	539
	LRD	Lake Region Old Lake Bed Deposits	2	588
	LRH	Lake Region Hills	10	1474
	LRM	Lake Region Spruce Covered Morains	1	1756
	SKM	South Kegulik Mountains	2	1691
	SRF	Savonski River Floodplain & Terraces	1	385
	SSL	Shelikof Strait Lowlands	8	414
	TTS	Valley of Ten Thousand Smokes	1	223
	WAM	Walatka Mountains	1	1623
<b>Total</b>			<b>41</b>	<b>16552</b>
<b>Aniakchak</b>	MRL	Meshik River Lowlands	1	365
	SAL1	Aleutian Range South-Highlands and Ridges	3	833
	SA:2	Aleutian Range South: Valley Slopes and Foothills	3	179
	SAL3	Aleutian Range South: Aniakchak River Floodplain	1	74
	NAL1	Aleutian Range North: Highlands and Ridges	1	1574
	NAL2	Aleutian Range North: Valley Slopes and Foothills	3	124
	NAL3	Aleutian Range North: Cinder River-Pumice Crk. Floodplain	2	160
	ANV1	Aniakchak Crater	1	76
	ANV2	Explosion Debris-Lava Flow Slopes & Ridges	1	221
	ANV3	Ash-Fall/Ash-Flow Plain	3	881
	ANV4	Complex Sedimentary & Volcanic Highlands & Ridges	8	264
	ACL	Aniakchak Coastal Lowlands	1	516
<b>Total</b>			<b>28</b>	<b>5267</b>

Sources: Lake Clark = Spencer (2002); Katmai = Shephard (2000), Aniakchak = Tande and Michaelson (2001).

Note: Size of subsections BRN, BRS, and SSL in Katmai are incomplete because the landcover layer for the Karluk Quadrangle was unavailable when these figures were generated.

## Budget

The following budget is preliminary and represents the most conservative (= costly) scenario in terms of implementation and logistics. Specifically, it assumes that the dispersed nature of the parks (200 km apart) and intra-park differences in seasonal chronology will require that each park be treated separately in terms of logistics and deployment of personnel. Further, because of differences in seasonal chronology among various groups of birds within each park, it assumes that two full, but shorter field seasons will be needed to census each park vs. one season that requires prolonged availability and use of helicopters and deployment of personnel.

**Table 3.** Proposed FY03-FY06 budget for the inventory of nesting landbirds in the Southwest Alaska Network of National Parks.

	FY03	FY04	FY05	FY06	TOTAL
<b>Personnel</b>					
Principal Investigator (Gill)	*	*	*	*	*
Co-PI (Tibbitts)	*	*	*	*	*
Collaborator (Handel)	*	*	*	*	*
GS-09 Proj. Assist./GIS-Database Manager	26,000	38,100	40,000	22,300	126,400
GS-05 Biological Technicians	4,600	7,800	8,400		20,800
<b>Equipment and Supplies</b>					
GPS Units (6 @ \$200)	1,200				1,200
USGS Maps/aerial photos/mylars	1,000				1,000
Misc. field equipment/food	3,000	2,600	2,600		8,200
Fuel	3,000	8,000	9,000		20,000
Fuel transport	1,500	3,000	3,000		7,500
Final Rpt. costs				1,000	1,000
<b>Aircraft (OAS)</b>					
Helicopter (Bell 206L-1 or Hughes 500)					
Dry rate/hour \$355 <sup>1</sup>	9,050	40,650	40,650		90,350
Availability @\$1800/day	10,800	46,800	46,800		104,400
Fixed-wing (C185/206)					
Wet rate/hour \$330	7,000	4,000	4,000		15,000
<b>Travel and Per Diem</b>					
Commercial to Port Alsworth					
RT @ \$300 each	1,200	2,400	2,400		6,000
Commercial to King Salmon					
RT @ \$500 each		4,000	4,000		8,000
Per Diem	1,000	2,400	2,500		5,900

**Table 3.** Continued.

	<b>FY03</b>	<b>FY04</b>	<b>FY05</b>	<b>FY06</b>	<b>TOTAL</b>
<b>SUBTOTAL</b>	69,350	159,750	163,350,	23,300	415,750
<b>Overhead (DOI Clients @ 15%)</b>	10,403	23,963	24,503	3,495	62,364
<b>TOTAL</b>	79,753	183,713	187,853	26,795	478,113
<b>Less \$95K LACL Fee Demo funds<sup>2</sup></b>	-50,000	-45,000			-95,000
<b>GRAND TOTAL</b>	22,753	138,713	187,853	26,795	383,113

\* Alaska Science Center scientists. Salaries covered by USGS base funds (total for 4 years = \$208,000.

<sup>1</sup> Hourly rate and daily availability reflect the average among 11 Alaska operators for each aircraft type. Final rates may vary by  $\pm 5$ -15% depending on which vendor is awarded the contract.

<sup>2</sup> NPS funds awarded to USGS in FY02 for work in LACL and applied to this project.

## **Vitae of Principal Investigators and Key Coworkers**

**Robert E. Gill, Jr.** Supervisory Research Wildlife Biologist and Project Leader—Shorebird Research. U.S. Geological Survey, Alaska Science Center, 1011 East Tudor Road, Anchorage, AK 99503. 907-786-3514 (phone), 907-786-3636 (fax), robert\_gill@usgs.gov (e-mail)

Robert Gill has been U.S. Department of Interior project leader for shorebird research in Alaska since 1976. He has extensive experience in design and implementation of field studies throughout the state. These range from short-term, site-specific studies of occurrence to long-term, range-wide assessments of status and size of populations. A major aspect of this work since the late 1980s has involved assessments of the distribution and population size of shorebirds identified at both the state and national levels as species of high conservation concern. Included in this effort have been studies of montane-nesting shorebirds on the Seward Peninsula (including Bering Land Bridge National Preserve) and eastern Norton Sound (1988–1992, 1999–2000), surveys of montane-nesting shorebirds in Cape Krusenstern National Monument (1996), studies of breeding biology of montane-nesting shorebirds in Lake Clark National Park and Preserve (1997–1999), and an ongoing effort (2001–2004) to inventory montane-nesting birds in the Arctic Network of Parks and several assessments of shorebird use of Chukchi Sea, Bering Sea, and Gulf of Alaska estuaries (1976–present). Most recently (1997–2000) Gill helped develop the U.S. Shorebird Conservation Plan by chairing the Plan’s research and monitoring working group. He currently serves as the North American representative to the International Wader Study Group and the East Asian-Australasian Wader Study Group. Gill earned both Bachelor’s and Master of Science degrees through the Avian Biology Laboratory, San Jose State University. He has authored over 80 peer-reviewed publications. Gill will serve as Principal Investigator for this effort.

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Lee Tibbitts has worked on shorebird projects at the Alaska Science Center since 1988. She has extensive experience censusing shorebirds in a variety of habitats and areas throughout Alaska. She participated in a comprehensive assessment of the status of Bristle-thighed Curlews (1988–1992, 1999–2000) on the Seward Peninsula and in the Nulato Hills. She also coordinated censuses of migrant shorebirds on the Alaska Peninsula (1993) and organized the ground-based component of a study of shorebird seasonal use of Cook Inlet (1997–1999). She participated in all phases of a multi-year study (1988–1994) of Bristle-thighed Curlew breeding ecology and population demographics and, more recently (1996–2000), conducted studies of the breeding ecology and foraging behavior of yellowlegs. Most recently she has coordinated the ongoing (2001–2004) effort to inventory montane-nesting birds in the Arctic Network of Parks. Lee earned a Bachelor's of Science degree from the University of Oregon and a Master of Science degree from Humboldt State University. She will serve as Assistant Project Leader for this effort.

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Colleen Handel has been involved in Department of Interior research in Alaska since 1975, primarily on behavior and ecology of shorebirds and since 1992 on landbird research. Her current focus involves developing integrated, regional monitoring programs for landbirds. Between 1989 and 1993 and 1999–2000 she was a Principal Investigator on the Bristle-thighed Curlew project with primary responsibility for the design and analysis of data for a study on breeding distribution and population assessment. Most recently she was primarily responsible for the design of the montane-nesting birds inventory that is ongoing (2001–2004) in the Arctic Network of parks. She earned a Bachelor's degree from Harvard University and Master of Science and Doctor of Philosophy degrees from the University of California, Davis. She has authored over 25 refereed publications. Colleen will provide guidance on study design and data analyses.

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# Montane-nesting Bird Inventory Southwest Alaska Network

